Do Economics Departments Improve After They Appoint a Top Scholar as Chairperson?

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28 August 2016

Abstract

There has been almost no research into what makes an effective chairperson in a university department. This paper constructs a historical longitudinal dataset on economics departments in 58 US research universities. It documents evidence that a department's research output tends to improve substantially when the incoming department Chair is himself or herself an outstanding scholar (in particular, is highly cited). The analysis adjusts for a set of other possible influences, including the standing of the department, university resources, the previous Chair, the trend in the department's productivity, and time-lags. Possible interpretations, and implications for future research, are discussed.

Key words: Citations, scientific productivity, department Chairs, expert leaders.
JEL Codes: I12, I23, M51, M54

Acknowledgements: We would like to thank the editors and referees; the many colleagues, especially Andrew Oswald, who have given us help and suggestions; and Andrea Lockhart for her excellent research assistance.

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I. INTRODUCTION

This paper is an attempt to contribute to the research literatures on intellectual productivity, the role of bibliometric data, and the nature of departmental leadership in universities. Although research is pursued in approximately 300,000 university departments, housed in more than 20,000 universities worldwide[4], little is known about the factors that help to shape the productivity of those departments[5]. The aim of the paper is to study the possible influence of chairpersons. Chairs (or 'Heads of Department') play a major role in the academic departments that make up universities. They manage daily operations, hire faculty and professional staff, and work closely with senior university administrators, most of whom were themselves once departmental heads. However, because faculty often view the position as a poisoned chalice, these chairpersons can be reluctant leaders, who are selected through either moral persuasion or a rotation system that sometimes depends as much on a scholar's age as aptitude for the job (Clotfelter & Rothschild, 1993; Ehrenberg, 1999, 2003).

Like Frey & Eichenberger (1993), Ehrenberg (2003), Rute Cardoso et al. (2010), Hamermesh and Pfann (2012) and Laband & Majumdar (2012), our focus is on empirical patterns in the subject of academic economics. The paper also touches, however, upon a wider and long-running set of debates about the measurement of research productivity, and on the use of citations data in academia (Taylor 2011).

The research begins by constructing a new source of data (for ourselves and other researchers who wish to use the data set). It compiles a panel data set on U.S. economics departments. To our knowledge, the later analysis is the first to examine the association between the characteristics of an incoming chairperson and the subsequent research productivity of his or her university department. The level of an individual chairperson's citations is found to be a predictor of later departmental productivity.[6] Although a long-standing literature examines the potentially substantive influence of citations data as informative signals (for example, Hamermesh et al. 1982, Laband 1986, and Laband & Sophocleus 1985, and Ellison 2011), the current paper's concern has not, to our knowledge, been previously explored. The study examines the statistical links between the characteristics of incoming Chairs and the later scientific productivity of their departments while that Chair is still in post. Some

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[5] Novel recent work by Adams & Clemmons (2011) explores a different mechanism than the one studied here.
[6] This study uses observational data and adopts the 'prospective' method of analysis that is common in medical science rather than a randomized-trial design (Antonakis, Bendahan, Jacquart & Lalive, 2010).

of the implied lags are necessarily long ones (in the case of the long-serving Chairs). Variables are defined more fully in the later Table 1.

This study cannot solve all potential problems of cause-and-effect, but, in an area where there is currently virtually no research knowledge, it is our hope that it might help to encourage future research. The paper pursues the so-called 'prospective' methodology that is common in medical longitudinal studies, and could be seen as a simple empirical beginning on a complicated issue. First, data are collected here on 169 chairpersons in 58 US university departments over 15 years, for one of the largest university disciplines, namely, the field of economics. Second, over the course of several years, measures of subsequent departmental research success were collected and checked using diverse websites and extensive hard-copy materials. The dependent variable in the regression equations is *the subsequent change in economics departments' research output*, after the Chair has been appointed, which is constructed as a measure of the relative improvement in departmental productivity. Several independent variables are controlled for, including institutional variables such as income and federal grants, and Chairs' other characteristics, such as their gender, experience and publications. Perhaps the most striking result is that there appears to be an increasing and concave statistical relationship between a Chair's citations and the subsequent department performance.

The data and descriptive statistics are presented in Section 3, and the econometric analyses and results follow in Section 4. Finally, in Section 5 we revisit the literature and discuss possible explanations.

II. BACKGROUND AND HYPOTHESES

There is a growing literature on the nature of scientific production and the importance of effective leadership in its success[7]. Recent work suggests that the management of research enterprise has become more complicated as modern scientific study is increasingly produced by teams, that have grown in size, are more likely to involve multi-university collaborations, that are ever more geographically dispersed (Adams, Black, Clemmons & Stephan, 2005; Wuchty, Jones & Uzzi, 2007; Jones, Wuchty & Uzzi, 2008). It is not surprising then that management practices, such as rewards and incentives, and research evaluation processes, are found to be associated with the performance of research teams (see Van der Weijden, de Gilder, Groenewegen & Klasen, 2008). Academic

[7] Early studies that modern work builds on include: Pelz, 1956; Andrews & Farris, 1967; Blume & Sinclair, 1973, among others.

departments frequently house many (ever-evolving) research teams and the head of these units must manage a larger, more heterogeneous group of faculty who have a broader mission than pure research (Hottenrott & Thorwarth 2011).

The role of academic departments, and the Chairs who manage them, is particularly critical in research universities that tend to be decentralised with devolved powers (particular in regards to managing faculty) going to departments. Their important function is highlighted in a new study that assesses the effect of management practices on the performance of universities (McCormack, Propper & Smith, 2013). McCormack, Propper & Smith (2013) examine management procedures in 112 UK universities using the measure of management quality tool developed by Bloom and Van Reenen (2007). McCormack and colleagues (2013) interview 248 department Chairs in the disciplines of Business, Computer Science, Psychology, and English. They find that the quality of management practices can be directly linked to better performance in both research and teaching. The result holds for all types of universities – research or teaching-focused, new or old. Of particular relevance to our study is their finding that it is management practiced at the level of academic departments, not by the centralized human resources that matters most to research and teaching performance.

Beerkens (2013) reports a similar finding in Australian universities that have been subject to increased competition by government since the mid-1990s. She uses a research management index that aggregates a number of management practices at the institutional, school and individual level. She finds that universities with intensive research management systems are associated with greater research productivity.

A small number of studies have looked at the influence of distinguished scholars on the productivity of their peers and co-authors. Azoulay, Zivin, & Wang (2010) found that the sudden death of a 'superstar' researcher led to the decline in collaborators' quality-adjusted publication rates. Oettl (2012a,b) builds on this work by looking at the social factors -- helpfulness to other scientists -- that may explain how star scientists affect others.

Chairs generally serve at the discretion of a senior manager (e.g. dean, provost, president) and prior work suggests that there is a systematic pattern to who holds the position. For example, department Chairs are disproportionately likely to be white and male, although women and minorities have recently been increasing in number (Carroll & Wolverton, 2004; Conrad, Carr, Knight, Renfrew, Dunn & Pololi, 2010). It is not unusual for senior administrators to select Chairs who have either undergone a decline in research productivity or made fewer research-specific investments

over their careers (McDowell, Singell & Stater, 2009; McDowell, Singell & Stater, 2011), although it is less common in Tier 1 research universities that assign greater weight to the research productivity of potential departmental Chairs (Moore, Newman, & Turnbull. 2003; Ness & Samet, 2010, Ehrenberg, 1999).

III. DATA AND BASIC STATISTICS

We constructed a dataset on 169 chairpersons in 58 US economics departments over a fifteen-year period between 1995 and 2010[8]. The data-collection process was necessarily deliberate, because it required a large number of hard-copy sources as well as more modern electronic ones. All sampled Chairs are observed for each year following his/her appointment and through the year following the end of the Chair term. For instance, a chair whose term encompasses the period beginning Fall 2001 through the end of Spring 2004 (i.e., a three-year appointment) would be observed in our data in the years 2002, 2003, 2004 and 2005. On average, each sampled chair is observed in 4.27 temporal periods. The independent variables in the regression equations include career and demographic information about each Chair, and our dependent variable includes measures of subsequent departmental research success.

(INSERT Table 1 HERE)

3.1 Dependent Variable

The dependent variable is the change in economics departments' research output after a Chair has been appointed. In our work, it is defined as a measure of the relative improvement in departmental productivity (see Table 1: Variable Definitions). Specifically, departmental research success is calculated as the change in the share of total weighted US economics Department publications (i.e.1/n and quality index) measured between the first year (t=0) of the Chair's appointment and the subsequent observed year t, where research output in any specific year t is measured by a 3-yr moving average in years t-1, t, and t+1.

[8] In the 58 departments, there were a total of 295 individuals who served as either a permanent or interim Chair between 1995 and 2010. Our sample excludes all interim Chairs, all Chairs who were appointed before 1995 or after 2007, and all permanent Chairs whose observed Chair term (for whatever reason) was less than two years.

As an illustration, the dependent variables associated with a chair whose appointment begins in 2001 and ends in 2004 would be as follows: in the 2002 observation, the dependent variable is measured as the department's share of total economics department publications in 2002 minus the share in 2001; in the 2003 observation, the dependent variable is measured as the department's share of total economics department publications in 2003 minus the share in 2001; in the 2004 observation, the dependent variable is measured as the department's share of total economics department publications in 2004 minus the share in 2001; and in the 2005 observation, the dependent variable is measured as the department's share of total economics department publications in 2005 minus the share in 2001. The dependent variable uses publications data (collected annually over the years 1995 through 2010) from 11 of the "most-selective" journals. These include: American Economic Review, Econometrica, Economic Journal, Economica[9], International Economic Review, Journal of Economic Theory, Journal of Monetary Economics, Journal of Political Economy, Quarterly Journal of Economics, Review of Economics and Statistics, and the Review of Economic Studies. Only data relating to full articles are collected, thus excluding comments, replies and other such shorter forms of communications.

Table A1 in the Appendix presents an illustrative ranking of economics departments over 15 years (1995-2010) using our dependent variable -- the mean annual research output of total weighted publications authored by individuals with an affiliation in a US economics department (for the need to be cautious about such rankings, see Laband 2013). Six institutions included in Table A1 could not be used in the empirical analysis because either: a) no Chair was appointed after 1994 for which at least 3 consecutive years can be observed (Arizona State University and Ohio State); b) unavailability of our university revenue variable, Integrated Postsecondary Education Data (Dartmouth and Rutgers); and c) there was insufficiently delineated Economics department (Caltech and Cornell).

3.2 Independent Variables

The independent variables in our regression equations draw upon information about the Chairs and their institutions (see Table 1). We include three measures for the Chair's research output, which is our key explanatory variable: Chair's citations represent the cumulative number of citations

[9] The inclusion of Economica may look surprising to some readers, but this is for the historical reason that it was an important journal in the early years in our data collection period.

made to the Chair's five most highly cited articles published prior to his/her Chair appointment (measured, out of necessity[10], as a citations total in the year 2016).

We also control for the number of years since each of the Chair's five most-cited papers were published (the total number of years are averaged). Finally, we include Chair's cumulative number of total weighted journal publications measured to year t. The weighted measures convert page counts to American Economic Association-equivalent pages, use the 1/n rule for co-authored articles, and apply a quality indexing using the journal "Impact Factors" provided in the various annual editions of the Social Sciences Journal Citation Reports.

Further information about Chairs' characteristics are included in the regressions: gender, whether they were foreign-born, the number of years the Chair has been in the current Chair position, their total experience at appointment measured as years since PhD to the year in which the current Chair term began, the years spent at each university, the number of institutions in which he or she had worked, and finally, we include a set of dichotomous variables indicating the Chair's research field (i.e. microeconomics, macroeconomics, history/thought, monetary, quantitative, public finance, international, agriculture/environmental, industrial organization, labor, other).

Controls for the nature of each institution are also incorporated (see Table 1). These measure the department's research output at the start of the Chair's term, the number of citations made to the five most highly cited articles published by the Chair who immediately preceded the current observed Chair, the size of each department (we include a proxy for the number of economics PhDs[11]), and the wealth of each university. To capture trends in the US academic markets for economists, we include variables that measure the Chair's institution's share of economics publications that do not go to economics departments (i.e. business schools), and the share of top publications assigned to authors not affiliated with a US economics department. Finally, we include a set of dichotomous variables indicating the calendar year (i.e. 1995, 1996, 1997 … 2010). Summary statistics for our variables are presented in Table A2.

[10] It could be argued that the ideal citations variable would be one taken during the year (say, 1995) when the Chair was being appointed. From the vantage point of 2016, this was not technically feasible for us. However, it should only lead to incorrect results in the rare case where there was a breakthrough article which took many years to be noticed by other scholars. Moreover, it might be argued that the 'true' research ability of a Chair is revealed to outsiders only after decades have passed, and on such an argument that could make our variable the appropriate one.

[11] It might be thought that we should control for the change in the size of department, but we wish to treat that as potentially influenced by the success of the Chairperson. We examine a kind of reduced-form equation.

IV. Econometric Analysis and Results

Table 2 reports the study's findings. Each rightward column introduces additional controls to a base specification in Column 1. For reasons of brevity, the results are condensed into a single table (a number of alternative variants have been tested and are available upon request). Clustered standard errors are used for the reported t-statistics in parentheses.

In Model 1 of Table 2, the key variable, Chair's citations, is statistically significant at the 5% level; the coefficient is 0.0687 and the t-statistic is 2.19. The coefficient on the quadratic term (of -0.0232) is negative and significant at the 5% level. It follows that the relationship between a department's research output and a Chair's research citations is estimated to be concave from below. There is diminishing marginal returns to Chair quality.

(INSERT Table 2 HERE)

The performance-citations relationship is plotted in Figure 1. Departmental performance, shown on the y-axis, maximizes within the figure where a Chair has approximately 14,800 citations. With a mean citation number of 3,531 and a standard deviation of 4,975, it is unclear how literally this exact turning point should be taken. The reason is that there are only 11 departmental heads who have citations in excess of 14,800. In our judgment, it may be more natural to view the evidence as confirming a highly concave relationship (perhaps because Chairs reduce their own research and thus face an opportunity cost, or perhaps because leadership input itself exhibits diminishing marginal returns in the way that inputs like labour and capital do).

The finding of diminishing returns to a Chair's citations appears to be a robust statistical conclusion.[12] Model 1 in Table 2 also suggests evidence that a department's research productivity may exhibit reversion to the mean. The coefficient on a department's research output at the start of a Chair's term is -0.1228 with a t-statistic of -2.64. Finally, and as a check for even longer lagged effects, the inclusion of a variable for the previous Chair's citations enters positively and significantly.

(INSERT Figure 1 HERE)

[12] We have experimented with other nonlinear functional forms.

A natural hypothesis is that what matters is a department head's own publishing productivity. Thus, Model 2 in Table 2 introduces controls for the total number of weighted publications and the timing of citations. Importantly, the magnitude, sign, and significance of both the level and quadratic terms on Chair's citations are barely affected by the introduction of these controls. Moreover, the coefficients on the level and quadratic terms for the total number of weighted publications are insignificantly different from zero. This finding implies that it is not the quantity of papers published by a Chair that matters but instead the extent to which the Chair's work has been recognized through cited references to his or her research[13]. In addition, the coefficient on the number of years since each of the Chair's most-cited papers were published is insignificant and has no effect on the link between the person's citations and the department's research productivity.

Model 3, in the third column of Table 2, introduces demographic attributes and other aspects of a Chair's career into the empirical specification. Again, the broad conclusions remain, and there is some evidence that the effect of the Chair's citations actually strengthens (now significant at the 1% level). The coefficients on some of the newly introduced controls in Model 3 are insignificant at traditional levels (i.e., the controls for gender, foreign-born, years as Chair, and Chair's years at current university). However, the estimated effect of the number of institutions where Chair has worked is positive and marginally significant. Moreover, there appears to be a non-linear, statistically significant effect associated with the Chair's experience at appointment, suggesting a Chair's years since PhD has a positive net effect after approximately two decades of experience. In other words, all else equal, the tradition of putting more senior faculty in the position of Chair may be consistent with a raising of a department's research productivity.

In Model 4 of Table 2 we include a number of further variables to control for the size of the Economics department and for university characteristics (see Table 1: Variable Definitions). In general, the conclusions drawn from the previous models are unaltered, although the estimated mean-reversion effect increases. Many of the newly introduced institutional variables are significant at traditional levels. Specifically, the share of publications to non-US economics departments has a significantly negative effect; this is presumably because articles that are published to authors outside the US economics departments reduce the available pool. The institution's share of economics publications that are authored by faculty based in non-economics departments (e.g., business and

[13] As an extra check we include a control for the Chair's own publications during his/her term as department head. We found no significance attached to the chair's "own contribution" control.

policy schools) in the Chair's institution is weakly positive. The Total Economics PhDs granted at the Chair's university' measures the number of economics PhDs conferred over the years 1995-2010, which is a proxy for the size of the department. This coefficient is positive but insignificant.

Two of the variables in Model 4 of Table 2 control for university income/revenues (data collected from the Integrated Postsecondary Education Data System). While the university's share of federal grants is not found to be significant, the total current revenue in year t is positive and significant at the 5% level. This variable comprises revenues from tuition and fees, government appropriations (federal, state and local), private gifts, grants and contracts, endowment income, sales and services of educational activities, "auxiliary enterprises", hospitals, "other sources", and "independent operations". It is noteworthy that the introduction of university revenue in Model 4 does not alter the previous results. However, the significance of the financial variable in Model 4 suggests that change in departmental quality -- research output -- is tied to aggregate university revenue. We checked for interaction effects of university revenue with the Chair variable and found no significance for such interaction terms.

Finally, highly cited Chairs might be found more often in departments with faster growing shares of publications because of a potential willingness of highly cited Chairs to go into leadership positions where department productivity is growing (and not because the highly cited Chairs contributed to the increased productivity). To explore this important possibility, an extra right-hand side variable, Department Productivity Trend, was added in the Model 4 econometric specification. This variable was constructed by using the coefficients for a linear time trend in department share of publications for each of the economics departments in the sample. The inclusion of this department-trend variable did not alter the main conclusions of the paper; we were unable to find evidence for the idea that the correlation between the Chair's citations and later departmental productivity is the result of the relative attraction of talented scholars into the position of Chair in flourishing departments.

The four specifications in Table 2 demonstrate that the citations-curve relationship is robust and economically significant. The evidence for a longitudinal link between a Chair's citations and the later research output of the department is not strongly influenced by changes in the detailed econometric specification. Second, the last row of Table 2 presents the number of citations at which the quadratic reaches its maximum in each model. The point at which the curve turns is numerically similar, at between 14,806 and 18,067 lifetime citations, across the four columns. If taken literally, the implied effect of Chairs is large. A one standard deviation rise in a chairperson's citations (from

a base of zero citations) is associated here with a later improvement of *approximately one half of a standard deviation* in the department's later research productivity[14].

V. DISCUSSION

What could be the mechanism through which Chairs have an influence on the research output of academic departments? How might this depend upon citations to their own research? Oettl (2012a, b) shows that the death of star researchers who are acknowledged by many people on academic papers – a measure of helpfulness – has a later effect on the productivity of co-authors. In later work, Agrawal, McHale, and Oettl (2014) examine the effect of top researchers on the productivity of 255 evolutionary biology departments. The authors find that the arrival of star researchers attracts subsequent high-quality scientists. This finding is strongest in mid-ranking universities. These studies may help us to understand our key finding. A Chair's research citations may signify that they are high on helpfulness (Oettle 2012a), and that they are able to recruit strong scholars to their departments (Agrawal, McHale & Oettl, 2014). Moreover, academics who have had successful research careers may behave differently when they become department Chairs.

Our study is closely related to earlier work (Goodall, 2006, 2009a,b) that uncovered a relationship between the research citations of a university president and the later research performance of their institution. Interviews with university presidents (Goodall 2009a,b) also revealed that scholar-leaders found it easier to recruit and retain other top scholars. This may be because of reputational factors (Hamermesh & Pfann, 2012), or because a head who is a cited scholar signals to potential recruits that he or she understands how to create the right environment for academics (Andrews & Farris1967; Goodall, 2009a,b). McCormack, Propper, & Smith (2013) show, in UK universities, that departments which are better managed demonstrate better performance in both research and teaching. Importantly, they conclude, as we do, that the results are not driven by differences in resources. Thus the nature of leaders seems to matter.

The suggestion that leaders and followers should share equivalent levels of technical expertise has also been examined previously in different settings – for example in basketball (Goodall, Kahn & Oswald, 2011) – and in early cross-sectional studies (e.g. Andrews & Farris, 1967; Barnowe, 1975; McAuley, Duberley, & Cohen, 2000; Mumford, Marks, Connelly, Zaccaro &

[14] In the long run, however, it is slightly smaller than this. That is because the equation is essentially a classical difference equation and the negative lagged dependent variable implies that steady-state effects will be lower.

Reiter-Palmon, 2000). Mumford, Scott, Gaddis, & Strange (2002) summarize these findings: they argue that technical and creative problem-solving skills are necessary when leading creative people, and that the evaluation of researchers and their ideas is best done by individuals who share their competencies. Also, leaders who have the same creative and technical abilities as their followers can communicate clearly and articulate the goals of the organization (Mumford et al., 2002).

VI. CONCLUSION

Comparatively little is known about academic leadership. In what we believe to be the first study of its kind, this analysis compiles a new dataset on, and examines the statistical connections between, the characteristics of incoming Chairs and the later productivity of economics departments. The study follows in the broader tradition of work such as Ehrenberg (2003).

We find that departments tend to increase their productivity after the appointment of a distinguished chairperson (and that this does not seem to be because top-scholar Chairs join departments that have already begun to flourish). The issue of exactly what makes an effective Chair, and why in particular a person's citations are an influential statistical signal, remains to be fully understood. Caution is thus prudent in the interpretation of the paper's findings[15]. Nevertheless, we hope that this paper may offer a contribution to the start of a research literature in this complex area.

[15] Tools used in natural experiments such as data on deaths of leaders (e.g. Jones & Olken, 2005) are not currently possible in our setting because so few Chairs die in post. We need therefore to be careful -- we want to emphasize -- not to give a definitive causal interpretation to the patterns in the data.

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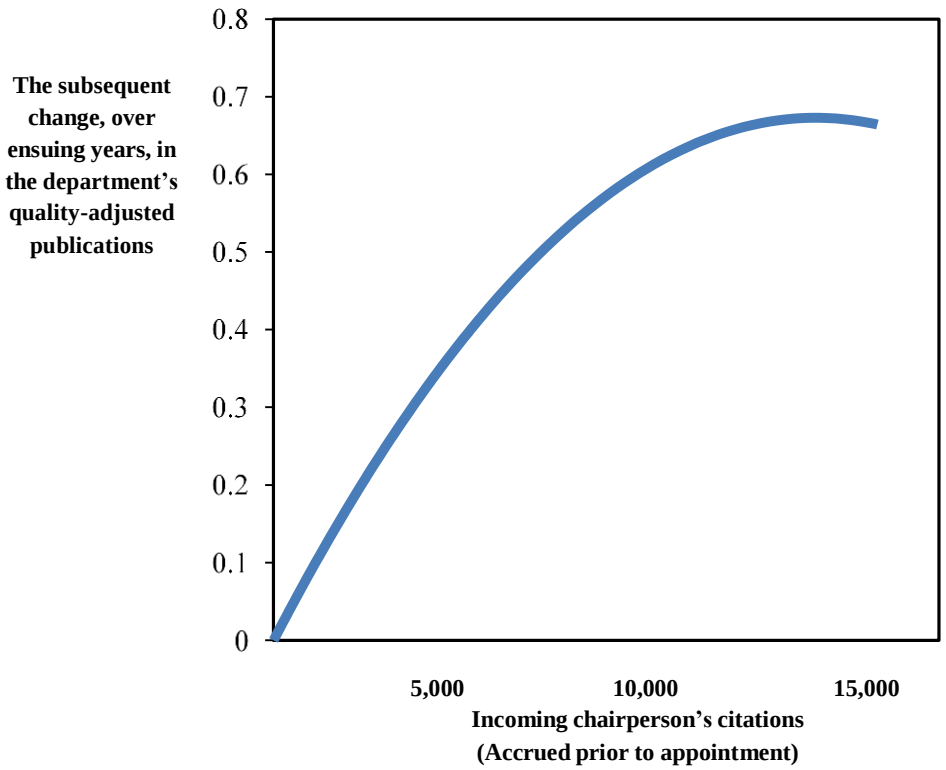
Figure 1

Improvement in Productivity of Economics Departments is Correlated with an Incoming Department Chair's Citations

[after controlling for the model 1 variables listed in Table 2]



Notes: (i) The dependent variable is defined in Table 1. It covers all the later years, not a single year, after the appointment of that Chair. (ii) Only 11 of 169 Chairpersons had lifetime citations above the turning point of approximately 14,800 citations. (iii) This curve is based on Column 1 in Table 2. (iv) The level of research output is measured as a 3-yr moving average.

Table 1

Variable Definitions

Dependent Variable

Change in department's research output: The change in a department's share of total US weighted publications (i.e. 1/n and quality index) is measured *between the first year (t=0) of the Chair's appointment and the observed year during the Chair's tenure as chairperson, t*. Tenures vary in length; some are long.

Research output in year t is measured by a 3-yr moving average in years t-1, t, and t+1.

Publications data is collected annually over the years 1995 through 2010 from the following select journals: American Economic Review, Econometrica, Economic Journal, Economica, International Economic Review, Journal of Economic Theory, Journal of Monetary Economics, Journal of Political Economy, Quarterly Journal of Economics, Review of Economics and Statistics, and the Review of Economic Studies. Only data relating to full articles are collected, thus excluding comments, replies and other such shorter forms of communications.

Independent Variables

(1) Chair's research output

Chair's citations: The cumulative number of citations made to the Chair's five most highly cited articles that were published prior to his/her Chair appointment (measured in 2012).

Previous Chair's citations: The cumulative number of citations made to the five most highly cited articles published by the Chair who immediately preceded the current observed Chair. These most-cited articles relate only to those that were published before the Previous Chair's year of appointment (where again the citations are measured in 2016).

Number of years since Chair's most-cited work: The number of years since each of the Chair's five most-cited papers were published; the total number of years are averaged.

Chair's total weighted publications: Chair's cumulative number of total weighted (i.e. 1/n and quality index) journal publications measured to year t.

The weighted measures convert page counts to AEA-equivalent pages, use the 1/n rule for coauthored articles, and apply a quality indexing using the journal "Impact Factors" provided in the various annual editions of the Social Sciences Journal Citation Reports.

(2) Chair Characteristics

Female Chair: Dichotomous variable = 1 if the Chair is female.

Foreign-born Chair: Dichotomous variable = 1 if the Chair has a non-US birthplace.

Years as Chair: The number of years the Chair has been in the current Chair position.

Chair's experience at appointment: The number of years since the Chair received his/her PhD to the year in which the current Chair term began.

Chair's years at university: The number of years that the Chair has worked at the university prior to his/her Chair appointment.

Number of institutions where Chair has worked: The number of institutions the Chair has had a permanent appointment measured from the PhD year to the year of the Chair's appointment.

(3) Institution Controls

Department's research output at the start of the Chair's term: The department share of total weighted US economics publications in the first year of Chair's term (this is an average of weighted publications in the year immediately prior to the Chair appointment, in the year of the appointment, and the first year after).

Share of world publications to non-US Economics departments: The share of all weighted publications in year t that are authored by individuals with a non-US economics department affiliation over the years 1995-2010.

Institution's share of economics publications to business and policy schools: The Chair's institution's share of all weighted publications in year t that are authored by individuals in a US non-Economics department (e.g. business schools, policy schools, etc.) over the years 1995-2010.

Total economics PhDs granted at Chair's university: The total number of economics PhDs granted by the Chair's university over the years 1995-2010.

University revenue: Total current fund revenues in year t (millions). This variable includes: tuition and fees, government appropriations (federal, state and local), private gifts, grants and contracts, endowment income, sales and services of educational activities, "auxiliary enterprises", hospitals, "other sources", and "independent operations". Data collected from the Integrated Postsecondary Education Data System (IPEDS).

University's share of federal grants: The Chair's university's share (%) of the total (i.e., in sampled institutions) federal grants in year t. Data collected from the Integrated Postsecondary Education Data System (IPEDS).

Department productivity trend: The department-specific productivity trend variable was constructed by using the coefficients for a linear time trend in department share of publications over the entire sample period of 1995-2010.

(4) Field dummies

Set of dichotomous variables indicating the Chair's research field (i.e. microeconomics, macroeconomics, history/thought, monetary, quantitative, public finance, international, agriculture/environmental, industrial organization, labor, other).

(5) Year dummies

Set of dichotomous variables indicating the calendar year (i.e. 1995, 1996, 1997 … 2010).

Table 2

Determinants of the Later Improvement in a Department's Research Performance

(The dependent variable is the change in the department's research output measured between the first year of the incoming Chair's appointment and the observed year.)

Explanatory variable	Model 1	Model 2	Model 3	Model 4
Chair's citations (scaled by 1000)	0.0687** (2.19)	0.0742** (2.24)	0.0887*** (2.80)	0.0813*** (2.68)
Chair's citations squared (scaled by 10 million)	-0.0232** (-2.05)	-0.0246** (-2.12)	-0.0288** (-2.65)	-0.0225** (-2.43)
Previous Chair's citations (scaled by 1000)	0.0220** (2.05)	0.0214** (1.98)	0.0249*** (2.53)	0.0230** (2.18)
Department's research output at the start of the Chair's term	-0.1228*** (-2.64)	-0.1204*** (-2.63)	-0.1118*** (-2.65)	-0.2549*** (-4.89)
Number of years since Chair's most-cited work		-0.0070 (-0.59)	-0.0218 (-1.54)	-0.0124 (-1.11)
Chair's weighted publications		-0.0045 (-0.58)	-0.0063 (-0.85)	-0.0053 (-0.77)
Chair's weighted publications squared (scaled by 10)		0.0005 (0.58)	0.0003 (0.44)	0.0006 (0.79)
Female Chair			0.1725 (1.00)	0.1306 (1.12)
Foreign-born Chair			-0.0099 (-0.11)	-0.0305 (-0.44)
Years as Chair			0.0187 (0.99)	0.0088 (0.51)
Chair's experience at appointment			-0.0769** (-2.01)	-0.0497** (-2.00)
Chair's experience at appointment squared			0.0019** (2.29)	0.0011** (2.00)
Chair's years at current university			0.0103 (1.19)	0.0096 (1.40)
Number of institutions where Chair has worked			0.1160* (1.70)	0.1134** (2.17
Share of world publications to non-US Economics departments				-0.169*** (-2.87)
Institution's share of publications to business and policy schools				0.0397* (1.93)
Total economics PhDs granted at the Chair's university				0.0008 (1.60)

University revenue[a]				0.0064** (2.01)
University's share of federal grants				-0.0555 (-1.39)
Department productivity trend				2.6217*** (4.34)
FIELD DUMMIES	YES	YES	YES	YES
YEAR DUMMIES	YES	YES	YES	YES
R^2	0.102	0.106	0.160	0.330
Citations number at which the Chair quadratic reaches its maximum	14,806	15,081	15,399	18,067

n=825; *** - significant at 0.01 level; ** - significant at 0.05 level; * - significant at 0.10 level;
Clustered t-statistics in parentheses.
Research output of a department is measured by a 3-yr moving average of quality-weighted publications
Field dummies are dummy variables for the Chair's sub-specialty.
The university revenue variable includes revenues from tuition and fees, government appropriations (federal, state and local), private gifts, grants and contracts, endowment income, sales and services of educational activities, "auxiliary enterprises", hospitals, "other sources", and "independent operations".

APPENDIX

Table A1

Economics Department Rankings

Economics Department Rankings based on the Mean Annual Research Output of Total Weighted Publications Authored by Individuals with an Affiliation in an Economics Department at a US University (publication counts measured over 1995-2010 in 11 select journals)[1, 2]

	Annual Research Output In All Years 1995 through 2010					Aggregate Research Output Shares in the Years		
	Rank[3]	Mean	St. d.	Min	Max	1995-02	2003-10	Change
Harvard	1	7.72	1.50	5.22	10.40	7.53	7.86	0.32
M.I. T.	2	7.03	1.49	4.39	9.99	7.85	6.45	-1.40
Princeton	3	5.33	2.06	2.07	8.12	5.76	4.76	-1.00
Univ. of Calif., Berkeley	4	4.32	2.21	0.73	8.45	3.14	5.76	2.61
Chicago	5	4.23	1.96	2.09	8.98	4.76	3.61	-1.14
New York University	6	3.67	1.44	0.93	6.31	3.24	4.07	0.82
Yale	7	3.44	1.44	1.50	6.60	3.22	3.63	0.40
Stanford	8	3.38	1.56	1.26	7.58	2.60	4.39	1.78
Northwestern	9	3.25	1.12	1.60	5.83	2.65	3.86	1.21
Pennsylvania	10	3.16	1.27	0.97	5.33	3.08	3.02	-0.06
Univ. of Calif., Los Angeles	11	2.91	1.09	1.14	4.13	2.33	3.66	1.32
Columbia	12	2.67	1.56	1.02	5.49	1.99	3.64	1.64
Michigan	13	2.17	0.86	0.76	3.85	2.41	1.82	-0.59
Univ. of Calif., San Diego	14	2.15	1.32	0.91	6.01	2.26	1.90	-0.36
Wisconsin	15	2.06	0.97	1.04	4.88	2.24	1.81	-0.43
Brown	16	1.98	0.89	0.61	4.02	1.82	2.16	0.34
Minnesota	17	1.74	1.04	0.59	5.03	1.65	1.82	0.17
Boston University	18	1.71	0.80	0.68	3.01	2.14	1.17	-0.96
Maryland	19	1.55	0.97	0.39	4.47	1.15	1.82	0.66
Texas, Austin	20	1.24	0.88	0.18	3.65	1.80	0.69	-1.10
Rochester	21	1.24	0.58	0.41	2.45	1.61	0.88	-0.73
Cornell	22	1.17	0.50	0.15	1.89	1.24	1.04	-0.20
Cal Tech	23	1.15	0.75	0.00	2.47	1.06	1.32	0.26
Duke	24	1.11	0.60	0.36	2.27	0.74	1.54	0.79
Ohio State	25	1.11	0.48	0.28	2.02	1.25	0.90	-0.34
Dartmouth	26	0.99	0.69	0.00	2.35	0.70	1.31	0.61
Johns Hopkins	27	0.96	0.55	0.21	2.04	1.15	0.70	-0.45
Carnegie-Mellon	28	0.90	0.41	0.00	1.71	0.71	1.09	0.38
Pittsburgh	29	0.90	0.68	0.09	2.23	1.10	0.61	-0.49
Penn State	30	0.90	0.53	0.21	2.02	0.92	0.85	-0.07
Illinois	31	0.86	0.61	0.06	2.36	0.96	0.84	-0.12
Univ. of Calif., Davis	32	0.85	0.52	0.13	1.90	0.83	0.91	0.07
Virginia	33	0.83	0.42	0.12	1.64	1.16	0.56	-0.59
Boston College	34	0.78	0.41	0.25	1.66	0.72	0.87	0.15
Georgetown	35	0.77	0.56	0.00	1.84	0.75	0.81	0.06
USC	36	0.75	0.59	0.05	2.38	0.66	0.73	0.06
Iowa	37	0.71	0.53	0.00	2.19	0.97	0.42	-0.54

Michigan State	38	0.70	0.45	0.16	1.67	0.80	0.56	-0.23
Univ. of Calif., Santa Barbara	39	0.67	0.53	0.04	1.68	0.71	0.65	-0.06
Arizona State University	40	0.63	0.52	0.00	1.51	0.66	0.74	0.08
Washington, St. Louis	41	0.53	0.37	0.00	1.17	0.46	0.64	0.18
Univ. of Calif., Santa Cruz	42	0.50	0.41	0.00	1.58	0.38	0.59	0.21
Florida	43	0.45	0.44	0.00	1.75	0.65	0.22	-0.42
Rutgers	44	0.43	0.39	0.00	1.43	0.69	0.24	-0.45
Univ. of Calif., Irvine	45	0.42	0.39	0.00	1.52	0.30	0.53	0.23
University of Arizona	46	0.41	0.22	0.00	0.90	0.44	0.39	-0.05
North Carolina, Chapel Hill	47	0.40	0.43	0.00	1.58	0.48	0.29	-0.18
Vanderbilt	48	0.40	0.20	0.00	0.79	0.44	0.36	-0.08
Texas A&M	49	0.39	0.46	0.00	1.71	0.54	0.23	-0.31
Houston	50	0.39	0.28	0.00	0.89	0.46	0.30	-0.16
Rice	51	0.37	0.37	0.00	1.15	0.38	0.28	-0.10
Washington	52	0.36	0.39	0.00	1.25	0.59	0.14	-0.45
Purdue	53	0.35	0.32	0.00	1.29	0.43	0.30	-0.13
Oregon	54	0.33	0.25	0.00	0.84	0.39	0.26	-0.12
Iowa State	55	0.32	0.28	0.07	1.23	0.20	0.49	0.29
Colorado	56	0.32	0.26	0.00	0.89	0.30	0.38	0.08
Indiana	57	0.30	0.20	0.00	0.61	0.39	0.23	-0.16
Emory	58	0.25	0.23	0.00	0.73	0.19	0.31	0.12
SUNY, Albany	59	0.24	0.24	0.00	0.84	0.29	0.22	-0.06
SMU	60	0.21	0.14	0.00	0.50	0.24	0.18	-0.06
Delaware	61	0.20	0.41	0.00	1.66	0.24	0.11	-0.13
VPI	62	0.16	0.20	0.00	0.58	0.26	0.05	-0.21
Notre Dame	63	0.16	0.23	0.00	0.62	0.11	0.23	0.12
George Mason	64	0.12	0.29	0.00	1.14	0.04	0.24	0.20

1 Publication data is collected annually over the years 1995 through 2010 from the following 11 selected journals: *American Economic Review, Econometrica, Economic Journal, Economica, International Economic Review, Journal of Economic Theory, Journal of Monetary Economics, Journal of Political Economy, Quarterly Journal of Economics, Review of Economics and Statistics, and the Review of Economic Studies.* Only data relating to full articles are collected, thus excluding comments, replies and other such shorter forms of communications.

[2] The weighted measures convert page counts to AEA-equivalent pages, use the 1/n rule for coauthored articles, and apply a quality indexing using the journal "Impact Factors" provided in the various annual editions of the Social Sciences *Journal Citation Reports*.

[3] To be included in these rankings, an institution's Department of Economics must have had one of the top-60 research outputs during either the 1995-2002 period or the 2003-2010 period (or both).

Table A2

Descriptive Statistics

	Mean	Std. Dev.	Min	Max
Dependent Variable				
Change in department's research output:	$-9.88E^{-6}$	0.629	-2.817	3.369
Independent Variables				
(1) Chair's research output				
Chair's citations (to 5 most-cited articles)	3531.5	4979.0	58	31323
Previous Chair's citations (to 5 most-cited articles)	3226.4	5113.0	56	31323
Years since Chair's most-cited work	12.97	4.79	2	33
Chair's total weighted publications	22.87	17.70	2.16	111.52
(2) Chair Characteristics				
Female Chair	0.067	0.250	0	1
Foreign born Chair	0.290	0.454	0	1
Years as Chair	3.24	1.98	1	15
Chair's Experience at Appointment	21.08	6.44	9	44
Chair's years at university	14.55	8.61	0	42
Number of institutions where Chair has worked	2.10	1.09	1	6
(3) Institution Controls				
Department's research output at the start of the Chair's term	1.531	1.763	0.000	8.562
Share of world publications to non-US Economics departments (%)	55.08	2.63	50.93	61.19
Institution's share of economics publications to business and policy schools (%)	1.73	3.08	0	14.48
Total economics PhDs granted at Chair's university	208.5	124.4	42	555
University revenue (100 millions)	18.311	13.654	1.002	101.599
University's share of federal grants (%)	1.64	1.13	0.06	5.72
(4) Field Dummies				
Microeconomics	0.158	0.365	0	1
Macroeconomics	0.108	0.310	0	1
History/Thought	0.044	0.204	0	1
Quantitative	0.102	0.303	0	1
Public Finance	0.050	0.217	0	1
Monetary	0.121	0.327	0	1
International	0.093	0.291	0	1

Agriculture/Environment	0.040	0.196	0	1
Industrial Organization	0.080	0.271	0	1
Labor	0.168	0.375	0	1
Other	0.036	0.187	0	1
(5) Time Dummies				
1996	0.019	0.138	0	1
1997	0.035	0.184	0	1
1998	0.052	0.222	0	1
1999	0.063	0.243	0	1
2000	0.068	0.252	0	1
2001	0.078	0.270	0	1
2002	0.081	0.272	0	1
2003	0.082	0.275	0	1
2004	0.079	0.270	0	1
2005	0.075	0.264	0	1
2006	0.084	0.277	0	1
2007	0.088	0.284	0	1
2008	0.076	0.266	0	1
2009	0.067	0.250	0	1
2010	0.051	0.220	0	1